ARTICLE XVIII.

Observations of Encke's Comet, at the High School Observatory, Philadelphia, March and April 1842, *with the Fraunhofer Equatorial, by Sears C. Walker, and E. Otis Kendall. Read May* 20, 1842.

THE following observations were made with a Fraunhofer Filarmicrometer, with illuminated wires, applied to the nine feet Equatorial. The value of a revolution of the Micrometer screw is 25″.626, as determined by several hundred transits of stars over the wires, the interval being varied from time to time, and measured on different parts of the scale. The magnifying power used for all these observations was seventy-five. On all the evenings except the 31st of March and 11th of April, the distance and position of the comet were measured from some known star or stars. On these two evenings this method was impracticable; there being no star visible in the same field of view with the comet, transits of the comet and stars preceding or following it, nearly on the same parallel, over the wires of the micrometer were observed, giving us of course only the correction of the ephemeris in right ascension for those two evenings. On all the others the corrections in right ascension, and declination were obtained.

No.	Observation.	Philadelphia Siderial Time. μ	Position. S′.	Turns of Micrometer Screw. m.	Measured Distance. s′	Remarks.
1	Comet from Star a 9th mag.	$7^h\ 36^m\ 0^s.3$		8.665	222″.06	1842, March 27.
2	b	7 40 53 .3		11.080	283 .94	Bar. 29.83.
3	a	7 50 5 .3	114° 55′			Att. therm. 56.
4	b	7 50 35 .2	51 35			No. 1 doubtful.
5	b	7 51 35 .2	53 35			
6	a	7 52 35 .2	113 7			
7	"	7 54 57 .2		9.827	251 .83	
8	b	7 59 21 .2		13.047	334 .35	
9	"	8 4 29 .1		13.954	357 .60	
10	a	8 7 50 .1		11.153	285 .82	
11	"	8 10 25 .1	108 40			
12	b	8 12 20 .1	55 40			

No.	Observation.	Philadelphia Siderial Time. μ	Position. S′.	Turns of Micrometer Screw. m.	Measured Distance. s′.	Remarks.
13	Comet from Star c 8th mag.	$7^h\ 37^m\ 55^s.1$		27.054	693″.31	1842, March 28.
14	"	40 51.1		27.687	709 .53	Bar. 30.11.
15	"	44 14.1	50° 34′			Att. therm. 44°.5
16	"	45 17.1	50 16			The comet had a
17	d 10th "	49 16.1		12.006	307 .67	tail 3′ 16″ in
18	"	50 54.0		12.078	309 .52	length, very
19	"	51 50.0	76 45			faint.
20	"	52 55.0	76 25			Position 55°.
21	e 11th "	8 0 2.0		11.402	*292 .20	* Comet from star
22	"	4 23.0		10.707	274 .39	e, position 167°
23	"	7 23.0		12.872	329 .87	nearly.
24	"	8 47.0		12.928	331 .30	
25	c	13 27.9		29.875	765 .60	
26	"	19 46.9		29.537	756 .93	
27	"	21 39.9		30.666	785 .87	
28	"	23 25.9	53 15			
29	"	25 32.9	53 8			
30	"	29 5.9	53 58			
						1842, March 31.
31	Comet from Star f 10th mag.	$7^h\ 52^m\ 14^s.8$	232° 19′			Bar. 30.03.
32	"	54 34.8		6.704	171″.81	Att. therm. 46°.
33	"	56 38.8		6.628	169 .86	No. 32 doubtful.
34	"	8 0 18.8		6.983	178 .95	
35	"	3 58.7		6.348	162 .68	
36	"	5 33.7	225 44			
37	"	8 23.7	223 57			
38	Diameter of nebula.	11 47.7		1.253		
		* $\mu' = (\mu + 22^s.412)$				Clock's rate+$6^s.7$.
39	Star g 7, 8 mag. on m=30	8 32 30.4				* μ' is time by
40	Comet on m=30	34 26.4				clock, fast $22^s.41$
41	Star g on m=30	35 59.4				of sid. time.
42	" on m=37.424	36 11.8				
43	Comet on m=30	37 52.6				
44	" on m=37.424	38 6.1				
						1842, April 1.
45	Comet from Star h 10th mag.	$7^h\ 50^m\ 51^s.1$		20.667	529″.63	Bar. 30.16 in.
46	"	53 51.1		20,817	533 .47	Att. therm. 50°.
47	"	55 46.1	91° 39′			Comet had a tail 7′
48	"	59 21.1	91 37			in length, faint.
49	"	8 11 24.0		21.233	544 .13	Position 56°
						1842, April 5.
50	Comet from Star i 9.10 mag.	$8^h\ 22^m\ 47^s.5$	139° 10′.5			Bar. 29.94.
51	"	24 20.5	139 40			Att. therm. 57°.
52	"	26 10.5	138 0			
53	"	42 12.4		36.670	939″.73	

No.	Observation.	Philadelphia Siderial Time.	Remarks.
		$* \mu' = (\mu + 37^s.817)$	1842, April 11.
54	Comet on m = 30	$8^h\ 53^m\ 23^s.6$	Clock's rate $+7^s.2$.
55	" " m = 40	53 40 .9	Bar. not noted.
56	Star k 8, 9 mag. " m = 30	55 5 .0	Att. therm. 68°.
57	" " m = 40	55 22 .5	* μ' is clock time, fast $37^s.82$ of sid. time.
58	Star l 9th mag. " m = 30	55 53 .4	
59	" " m = 40	56 10 .3	
60	Comet " m = 30	57 47 .2	
61	" " m = 40	58 0 .2	
62	Star k " m = 30	59 24 .6	
63	" " m = 40	59 42 .8	
64	Star l " m = 30	9 0 12 .5	
65	" " m = 40	0 31 .7	

The true right ascensions and declinations of the stars of comparison, on the evenings of observation, were as follows:—

a =	1^h	46^m	$11^s.18$, a' = +	16°	46′	26″.04, *	9	mag., Bessel's Zone,	394
"	1	46	11 .28, "	16	46	31 .26,	9	, Lalande, H. C., p.	192
b	1	46	10 .55, b'	16	41	24 .72,	9	, Bessel's Zone,	394
c	1	49	25 .88, c'	16	46	1 .69,	8	, " "	"
"	1	49	25 .51, "	16	46	8 .32,	8, 9	, Lalande, H. C., p.	192
d	1	49	41 .70, d'	16	52	32 .70,	10	, Anonym. Approx.	
e	1	50	5 , e'	16	59	20 ,	11	, " "	
f	2	1	4 .60, f'	17	15	12 .90,	10	, " "	
g	1	59	6 .71, g'	17	16	29 .60,	7, 8	, Bessel's Zone,	394
"	1	59	6 .51, "	17	16	33 .80,	7, 8	, " "	332
"	1	59	6 .01, "	17	16	29 .60,	7, 8	, Piazzi.	
h	2	3	52 .90, h'	17	16	51 .50,	10	, Anonym. Approx.	
i	2	17	18 .20, i'	17	17	0 .70,	9,10	, " "	
k	2	31	58 .31, k'	15	0	18 .69,	8, 9	, Bessel's Zone,	394
"	2	31	58 .10, "	15	0	20 .83,	8, 9	, " "	141
l	2	32	46 .87, l'	14	57	48 .28,	9	, " "	141
"	2	32	47 .35, "	14	57	51 .90,	9	, " "	32

The measures and transits observed with the filarmicrometer have been reduced by the formulæ of Bessel in the Astr. Nachr., No. 69, and in the Königsberg Observations, Vol. XV., p. 22. Those of the same star have been referred to a common epoch by means of Encke's Ephemeris. The probable

errors are computed from a comparison of the single results in the usual manner. The true places of the comet in right ascension and declination have thus been obtained, free from the effect of aberration, parallax, and refraction.

Date.	Siderial Time at Philadelphia.	Comet's place freed from Aberration, Parallax, and Refraction.		Single Results. No. of
1842.	μ	α = Comet's true R. A.	δ = Comet's true Dec.	
March 27	$7^h\ 54^m\ 57^s$	$a + 0^m\ 18^s.358 \pm 0^s.06$	$a' - 1'\ 29''.38 \pm 1''.9$	3
—	7 59 21	$b + 0\ 20.404 \pm 0.60$	$b' + 3\ 29.28 \pm 2.3$	3
28	7 37 55	$c + 0\ 39.279 \pm 0.16$	$c' + 7\ 43.22 \pm 2.1$	5
—	7 50 54	$d + 0\ 22.790 \pm 0.03$	$d' + 1\ 20.91 \pm 0.3$	2
31	7 54 35	$f - 0\ 7.860 \pm 0.12$	$f' - 1\ 46.13 \pm 1.6$	4
—	8 36 34	$g + 1\ 56.222 \pm 0.65$		3
April 1	7 50 51	$h + 0\ 38.149 \pm 0.34$	$h' - 0\ 8.51 \pm 0.4$	3
5	8 42 12	$i + 0\ 45.608$	$i' - 11\ 26.31$	1
11	8 53 36	$k - 1\ 41.525 \pm 0.19$		4
—	8 54 1	$l - 2\ 29.715 \pm 0.28$		4

By applying the places of the known stars in the above collection, we obtain:

Date.	Siderial Time at Philadelphia.	Comet's true Right Ascension and Declination from Observation.		Correction of Encke's Ephemeris.		No. of Results.	Authority for star's place.
1842.	μ.	α	δ	Cos. $\delta\ \Delta\ \alpha$.	$\Delta\ \delta$.		
March 27	$7^h\ 54^m\ 57^s$	$1^h\ 46^m\ 29^s.54$	$+\ 16\ 44\ 56.7$	$+\ 0^s.57$	$+\ 5''.4$	3	Bessel's Zone.
—		1 46 29.64	+ 16 45 1.9	+ 0.67	+ 10.6	3	Lalande, H. C.
—	7 59 21	1 46 30.95	+ 16 44 54.0	+ 1.30	+ 0.9	3	Bessel's Zone.
28	7 37 55	1 50 5.16	+ 16 53 44.9	+ 2.75	+ 2.6	5	" "
—		1 50 4.79	+ 16 53 51.5	+ 2.40	+ 9.3	5	Lalande, H. C.
31	8 36 34	2 1 2.83		+ 0.33		3	Bessel's Zone.
—		2 1 2.23		— 0.24		3	Piazzi.
April 11	8 53 36	2 30 16.67		— 1.85		4	Bessel Zones.
—	8 54 1	2 30 17.40		— 1.16		4	" "
Mean of 33 results, cos. $\delta\ \Delta\ \alpha$ = $+\ 0^s.65 \pm 0^s.32$.							
" 19 " $\Delta\ \delta$ = $+\ 5''.8 \pm 1''.2$.							

The High School observatory is $5^h\ 0^m\ 41^s.9$ west of Greenwich. Latitude N. 39° 57′ 8″.

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